

Two New Subspecies of *Synchelidium* (Crustacea: Amphipoda: Oedicerotidae) from the Sea Shore of Northeast Japan

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ABSTRACT—Two new subspecies of gammaridean Crustacea, *Synchelidium americanum latipalpum* and *S. miraculum lenorostratum*, are described and illustrated from specimens collected from the surf zone in Ôtsuchi Bay, Iwate Prefecture, Northeast Japan. The former belongs to the group that is characterized by tiny dactyls of pereopods 1-2; it differs from *S. americanum* Bousfield, 1973 in the shape of the coxa 3, mandible and telson. The latter belongs to the group that bears elongate dactyls of pereopods 1-2; it is distinguished from *S. miraculum* Imbach, 1967 by the antenna 1, mandible, pleonal epimeron 2, uropods and telson.

INTRODUCTION

During an ecological study of marine benthic animals in the shallow water of Ôtsuchi Bay, Northeast Japan, Dr. A. Tamaki collected many gammaridean specimens which were made available to me for study. This collection contains some undescribed species and here is taken an opportunity to describe two new subspecies of *Synchelidium*.

All the type-specimens here described are deposited in the collection of the Amakusa Marine Biological Laboratory, Kyushu University, Kumamoto.

Synchelidium americanum Bousfield, 1973
latipalpum n. subsp.
(Figs. 1-4)

Description

Body: Body comparatively slender. Rostrum strongly deflexed. Eyes feebly fused middorsally, occupying most of forehead. Pereon flexible. Pleonal epimeron 1 rectangular, anterior margin densely pubescent on upper half part and setose on

lower half part; pleonal epimeron 2 weakly and broadly produced posteroventrally. Urosome subequal to pleomite 3 when measured in dorsal midline; urosomite 1 pectinate dorsally in 2 opposite longitudinal rows, posteroventral part of both lateral sides with 1 spine; urosome 3 mostly concealed beneath telson.

Antennae in male: Antenna 1 $1\frac{1}{4}$ as long as body length; segment 1 of peduncle reaching end of rostrum, stubby, segment 2 compressed proximally, unusually setose; flagellum 8-articulate, segment 1 longer than segment 3 of peduncle, ventrally setose in transverse rows, bearing 1 terminal spine, following 4 segments ventrally provided with 1 terminal spine, segments 4-5 distally with 1 aesthetasc. Antenna 2 subequal to body length; peduncle shorter than antenna 1, gland cone small, segment 3 with 1 distodorsal pair of spines, segment 4 twice as long as segment 3, with 2 dorsodistal pinnate setae, segment 5 $\frac{2}{3}$ as long as segment 4, ventrally provided with 1 median row of 5 spines and 2 pinnate setae, distally with many simple and 1 pinnate spines.

Antennae in female: Antennae less than $\frac{1}{4}$ as long as body length. Antenna 1 slightly shorter than antenna 2, similar to that of male; flagellum 5-articulate, each segment with terminal setae. Peduncle of antenna 2 similar to that of male, segment 4 with 1 distal row of 8 simple setae,

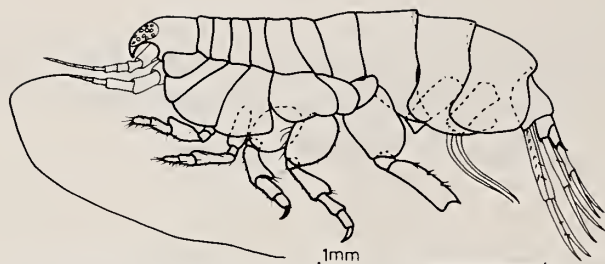


FIG. 1. *Synchelidium americanum latipalpum* n. subsp. Holotype: Male, 2.75 mm.

ventrally provided with 1 row of 7 simple setae, distally with long setae, all these setae bifid apically; flagellum 6-articulate, each segment with a few terminal spines except for ultimate.

Mouthparts: Apical margin of upper lip broad, pectinate medially. Oval outer lobes of lower lip almost coalescent into inner lobe and obliquely sitting on it. Inner lobe of maxilla 1 with 1 terminal pinnate seta; outer lobe distally provided with 2 bifid, 3 pectinate and 2 stout simple spines, all tooth-like; palp biarticulate, distal segment elongate, with 3 pairs of setae on distal 1/3 part of length. Inner lobe of maxilla 2 semioval, apically with 1 pinnate and 5 unplumose setae; outer lobe apically with 6 unplumose setae. Incisor of mandible broad, two-toothed; lacinia mobilis bifid on left mandible, and broad and with 5 blunt teeth on right mandible; 4 accessory blades pectinate; molar process pseudotritulative, with 1 longer, distally pinnate and 1 naked teeth; palp well developed, segment 2 with 2 pairs of simple setae at 1/3 from proximal part, segment 3 as long as segment 2, bristly, bearing fringe of 16 simple setae on apical margin and distal 3/4 part of inner margin. Inner lobe of maxilliped distally provided with 4 tooth-like spines; outer plate reaching midlength of palp segment 2, provided with 6 tooth-like spines on inner margin; palp segment 3 rectangular, terminal segment falcate, as long as segment 3.

Gnathopod 1: Relatively small. Coxa 1 rectangular, posteriorly with 1 spine at 1/3 from ventral angle, posteroventral setae elongate. Merus scale-like, contiguous to posteroproximal part of carpus. Carpus thin; lobe overreaching propod, slender, taper, posterior margin with 1 distal seta and another at 1/3 from distal end,

anterior margin concave, with 1 spine near apex and 3 setae on distal 1/3 part of length. Propod subrectangular; palm defined by 1 spine, transverse, with 11 chisel-like teeth, and 1 pinnate and 3 unpinnate setae on outer side, and 7 unpinnate setae on inner side; half part from anterodistal end pectinate and the other smooth. Dactyl fitting on palm when closed.

Gnathopod 2: Chelate, slender. Coxa 2 twice as deep as coxa 1, posteriorly provided with 2 different-sized spines on half part from ventral angle. Merus scale-like, about twice as long as ischium, fitting proximal concavity of carpus. Carpus and propod fused, almost as long as basis, coalescent scar obscure; palm finely pectinate, with 4 pairs of short setae and about 7 small spine-like setae, apex hooked inward, pointed, with 1 inner spine. Dactyl apically hooded, fitting opposite concavity of palm.

Pereopod 1: Coxa 3 1.5 times as broad as coxa 2, ventral half part of posterior margin with 4 spines gradually decreasing in size, and 4 short, equal-sized setae. Basis 2/5 as long as whole length of pereopod 1, with 1 posterodistal slender spine. Merus 2/3 as long as basis, posterior short setae mostly curved distally. Carpus 2/3 as long as merus, 6 or 7 posterior paired setae distally curved as in preceding segment. Propod about half as long as merus, subcylindrical, flattened posteriorly, outer surface with 7 fine setae along posterior margin, posterodistal margin with 14 stout, long setae, all bifid and curved distally. Dactyl vestigial.

Pereopod 2: Very similar to pereopod 1. Coxa 4 produced posteriorly, with 4 anteroventral fine and 5 ventromedial short setae.

Pereopod 3: Anterior lobe of coxa 5 minutely



FIG. 2. *Synchelidium americanum latipalpum* n. subsp. Holotype: Male, 2.75 mm. A: Head. B: Antenna 1 of male. C: Antenna 2 of male. D: Upper lip. E: Lower lip. F: Maxilla 1. G: Maxilla 2. H: Right mandible. I: Left mandible. J and K: Maxilliped. L: Antenna 1 of female (Paratype, 3.50 mm). M: Antenna 2 of female (Paratype, 3.50 mm). N: Gnathopod 1. O, O-1 and O-2: Gnathopod 2. P: Pereopod 1.

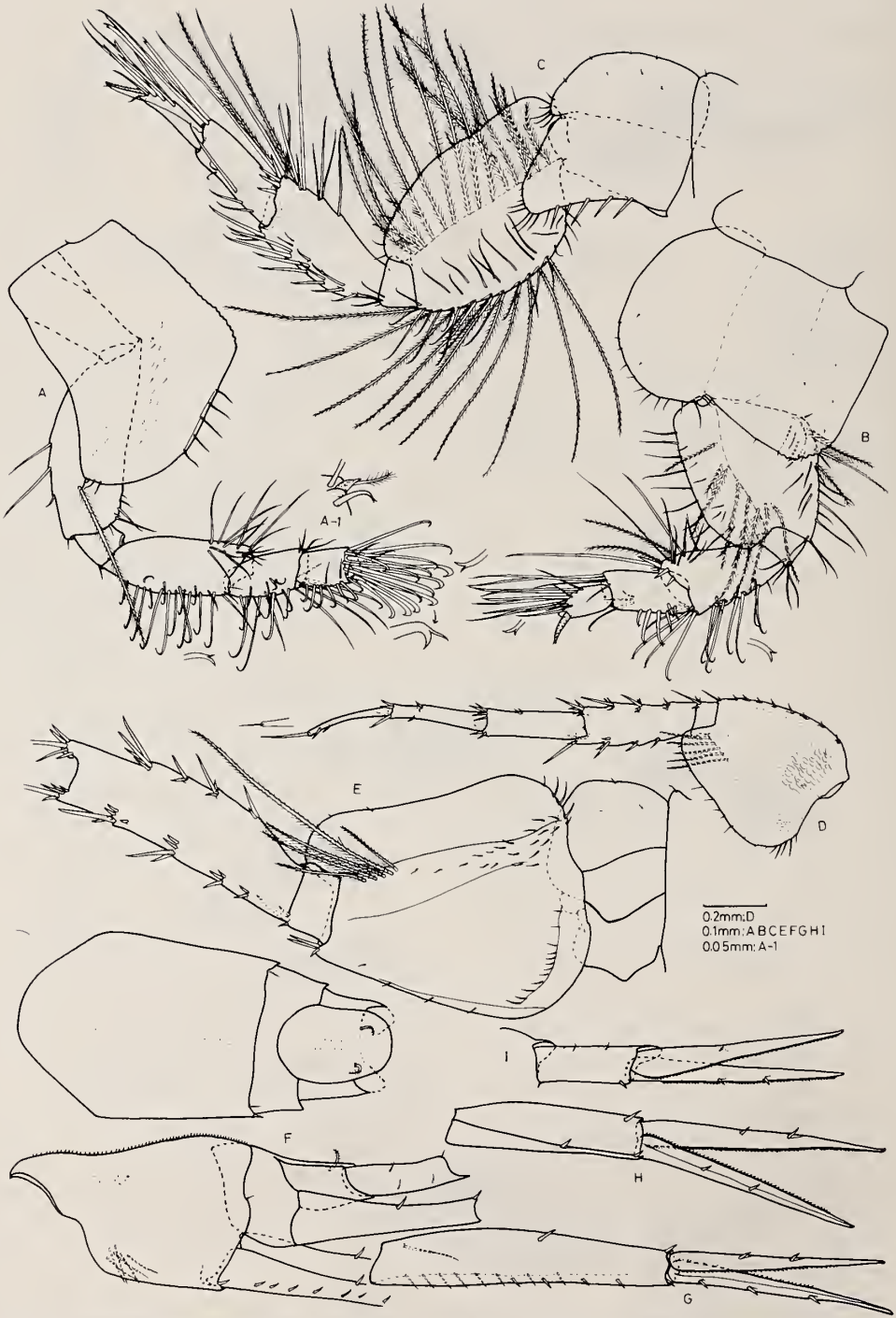


FIG. 3. *Synchelidium americanum latipalpus* n. subsp. Holotype: Male, 2.75 mm. A and A-1: Pereopod 2. B: Pereopod 3. C: Pereopod 4. D: Pereopod 5 (Paratype, female, 3.50 mm). E: Pereopod 5 (Holotype). F: Urosome. G: Uropod 1. H: Uropod 2. I: Uropod 3.

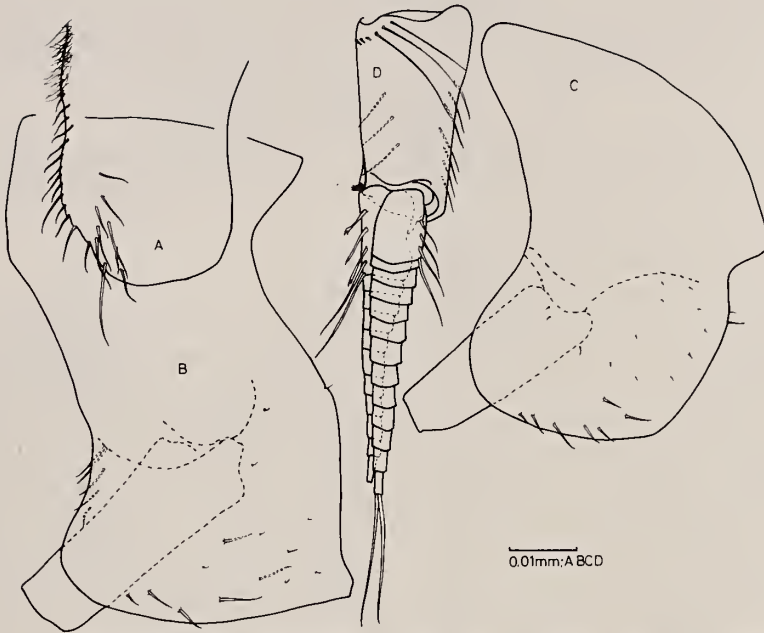


FIG. 4. *Synchelidium americanum latipalpum* n. subsp. Holotype: Male, 2.75 mm. A: Pleonal epimeron 1. B: Pleonal epimeron 2. C: Pleonal epimeron 3. D: Pleopod 1.

crenulate anteroventrally. Basis about half as large as coxa 5, nearly square. Merus shorter than basis, widened distally, widest portion nearly twice as wide as proximal part, anterior bifid setae distally curved, anterodistal setae 5, thick and various in length, posterodistal end feebly produced, with 3 spines and 1 simple seta extending far beyond dactyl. Carpus shorter than merus, anteriorly with 6 spines. Propod 2/3 as long as carpus, slightly dilated medially, posterodistal extension with 1 seta. Dactyl 2/3 as long as propod, spine-like, pectinate in 2 opposite longitudinal rows along posterior margin.

Pereopod 4: Similar to pereopod 3, but larger. Anterior lobe of coxa 6 produced anteroventrally, with 5 anterior spines, ventral margin of posterior lobe with 5 short setae. Thick posterior setae formula on merus 1-2-3-3-2-1, posterodistal end with 4 spines and 2 very long setae of which one is pinnate. Carpus posterodistally provided with 2 elongate, bifid spines and 1 long seta. Propod with 3 groups of 1 elongate, bifid spine and 1 unplumose long seta, and 2 distal short setae.

Pereopod 5: About twice as long as pereopod

4. Coxa 7 semioval. Basis pubescent and provided with 6 spines on proximal muscular part. In merus, posterior process somewhat more prominent than anterior one, both processes with 1 pronounced and 4 additional small spines. Merus, carpus and propod equal in length. Dactyl slightly shorter and slenderer than propod, truncate, distally provided with 2 spines, apical seta stiff, measuring about half length of dactyl.

Pleopods: Pleopods well developed, very similar; proximal segment of outer ramus with 3 bifid and 2 simple setae, these setae pinnate; terminal swimming setae less than half as long as rami.

Uropods: Uropods slender, rami lanceolate, pectinate on one side margin. Peduncle of uropod 1 longer than rami, outer lateral side bearing 1 proximal long and 8 short setae on proximal 2/3 of length; outer ramus slightly longer than inner ramus, with 3 equidistant spines, inner ramus with 2 spines. Rami of uropod 2 equal-sized, each with 2 median spines. Peduncle of uropod 3 produced distoventrally into lobe of semioval shape; rami equal-sized, outer ramus with 2 medial spines, inner ramus with 1 median spine.

Telson: Telson oval, with 1 pair of pinnate setae at 1/3 from posterior end.

Remarks

The gnathopod 1 with both a prolonged carpal lobe and the transverse palm bearing 11 denticles and the dactyl of the pereopod 5 shorter than the propod, all characteristic of *Synchelidium americanum* Bousfield from the northeast coast of Canada [1, 2], are also shared with the present form. However, this form may be distinguished by the following particulars: (1) the mandibular palm of the present form is stouter than that of *S. americanum*; (2) the telson is gently rounded on the posterior margin in the present form, while it is truncate and feebly emarginate in *S. americanum*; (3) the coxa 3 is about 2/3 as broad as the coxa 4 in this form whereas in *S. americanum* it is about half as broad as my interpretation form from the figure of Bousfield [1]; and (4) the molar process of the mandible bears 2 tooth-like spines, 1 small and the other pinnate in the present form instead of a single pinnate one as in *S. americanum*. I believe that the above-listed differences may be of less than specific importance, and here is proposed a new subspecies, *Synchelidium americanum latipalpus*, for the Japanese population.

Material examined

Holotype: Male, 2.75 mm. **Type-locality:** Surf zone in Ôtsuchi Bay, Iwate Prefecture. **Date:** April 9th, 1978. **Paratype:** 3 specimens collected

with the holotype (Female; 3.50 mm, 4.25 mm, 3.50 mm). **Collector:** Akio Tamaki. **Collection No.:** AMBL-Amph. 44.

Synchelidium miraculum Imbach, 1967 *lenorostralum* n. subsp. (Figs. 5–7)

Description

Body: Large, spotty and somber, coxae 1–6 and pereopod 5 well developed, especially coxae 4–5 prominent. Rostrum gently deflexed, meeting apex of peduncular segment 1 of antenna 1. Eyes largely coalescent to each other. Posteroventral angle of pleonal epimeron 2 slightly produced backward, acute. Lateroventral margin of urosomite 1 with 1 anterior pair of setae and 1 posteroventral small spine; ventrodiscal end of urosomite 3 producing to apex of telson.

Antennae: Antenna 1 subequal to peduncle of antenna 2 in length; peduncle setose, segment 1 stubby, segment 2 about half as long as segment 1, segment 3 longer than segment 2, with 2 proximal spines; flagellum 9-articulate, segment 1 a little shorter than peduncular segment 3, distally with 1 or 2 spines and several setae. Peduncular segment 2 of antenna 2 rectangular, gland cone medium, upper distal part of segment 3 produced, with 1 transverse row of setae, segment 5 longer and slenderer than segment 4, ventrodistally provided with 1 spine and 1 plumose and 3 unplumose setae;

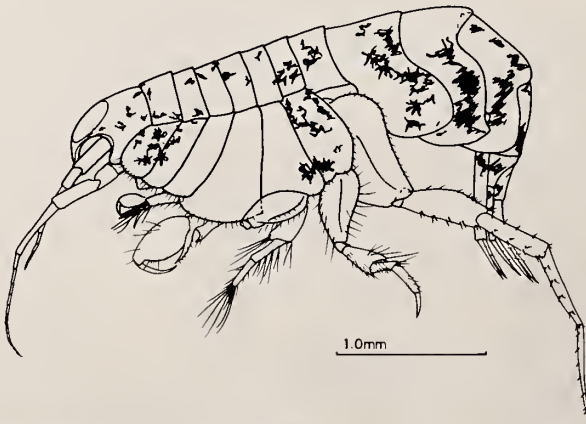


FIG. 5. *Synchelidium miraculum lenorostralum* n. subsp. Holotype: Female, 4.75 mm.

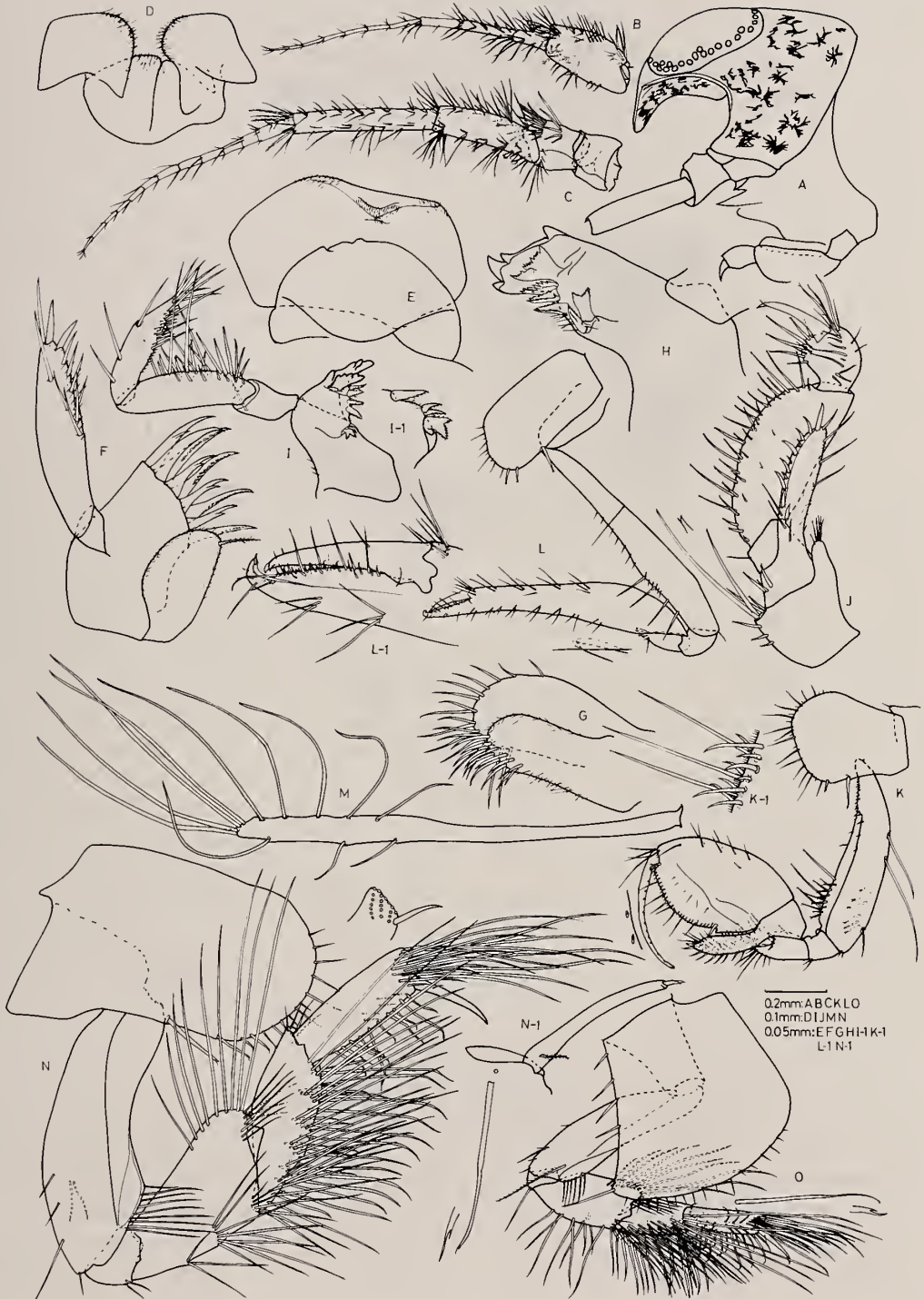


FIG. 6. *Synchelidium miraculum lenorostratum* n. subsp. Holotype: Female, 4.75 mm. A: Head. B: Antenna 1. C: Antenna 2. D: Upper lip. E: Lower lip. F: Maxilla 1. G: Maxilla 2. H: Right mandible. I and I-1: Left mandible. J: Maxilliped. K and K-1: Gnathopod 1. L and L-1: Gnathopod 2. M: Oostegite. N and N-1: Pereopod 1. O: Pereopod 2.

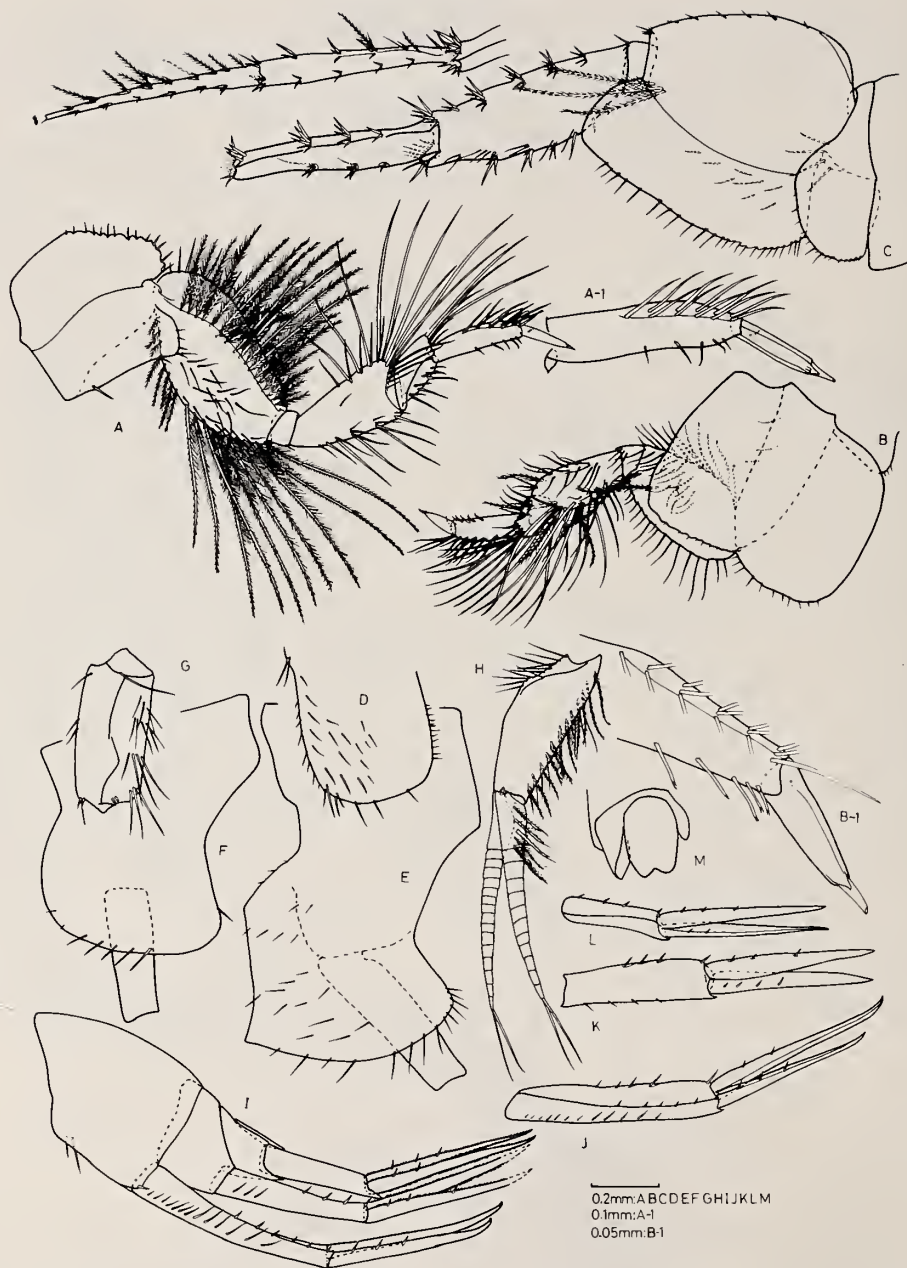


FIG. 7. *Synchelidium miraculum lenorostratum* n. subsp. Holotype: Female, 4.75 mm. A and A-1: Pereopod 3. B and B-1: Pereopod 4. C: Pereopod 5. D: Pleonal epimeron 1. E: Pleonal epimeron 2. F: Pleonal epimeron 3. G: Peduncle of pleopod 3. H: Pleopod 1. I: Urosome. J: Uropod 1. K: Uropod 2. L: Uropod 3. M: Telson.

flagellum subequal to peduncular segments 4-5 combined in length, proximal segment shorter than 1/3 as long as peduncular segment 5.

Mouthparts: Inner plate of lower lip coalescent on base, pubescent; mandibular process weak. Inner plate of maxilla 1 apically with 1 pinnate

seta; outer plate provided with 5 teeth medially armed with 1 stout tooth, and 4 teeth pectinated in 2 longitudinal rows; palp biarticulate, distal segment elongate, distal half part of length with 1 oblique row of 3 slender spines, 1 row of setae along inner margin and 5 marginal spines on inner side, apex provided with 1 slender and 2 stout spines. Inner plate of maxilla 2 apically provided with 6 pairs of spine-like setae; outer plate distally provided with 4 pairs of setae and 4 proximal setae on inner side, and 6 setae on outer side. Lacinia mobilis of mandible broad, serrate apically on right mandible and provided with 5 conical teeth on left mandible; from apex to molar process pubescent, with 3 or 4 accessory teeth pectinated in 2 opposite rows; molar process pseudotrutritative, with 1 bifid, broad rugose tooth plus 1 falcate tooth on right mandible and plus 2 falcate teeth on left mandible, these falcate teeth pectinate in 2 longitudinal rows; palp triarticulate, segment 2 about 3 times as long as proximal segment, on inner margin with 3 very long spines and many short and longer spines in 3 rows, distal segment finely spinose on inner margin, on half margin from distal end with 2 rows of 4 longer and 7 short spines, and 5 apical short spines. Inner plate of maxilliped with 8 apical spines, inner side of basal segment with 3 short spines and 1 distal set of 2 very long and 2 short spines; outer plate with 12 teeth and 3 short setae on inner side, and 3 longer setae on outer side, basal segment with 3 inner-median stout spines; 3rd segment of palp bulbous, not produced outer-distally, provided with 1 longitudinal row of 14 spine-like setae on upper side, and 1 row of 6 spines and 4 small spine-like setae on inner-distal margin.

Gnathopod 1: Coxa 1 posteriorly armed with 2 spines. Basis pectinate anteroproximally, with many short and long spines on an anterodistal outer side and 6 short spines on posterodistal inner side. Merus about twice as long as ischium. Posterior lobe of carpus overreaching palm, broad, provided with 3 longitudinal rows of spines throughout and 1 apical spine on inner side. Propod oval, continuously rounded on posterior margin and palm; palm twice as long as posterior margin, defined by 1 stout spine and cusp, finely pubescent, with 3 rows of 7 longer stiff setae and

about 23 pairs of short stout setae. Dactyl fitting on palm when closed, grasping margin provided with 10 pit organs.

Gnathopod 2: Chelate, slender, elongate. Coxa 2 posteriorly with 2 ventral and 1 median spines. Basis shorter than propod, distal 2/3 of anterior length with 4 stiff setae. Merus put in concavity of propod distally. Carpus and propod almost coalescent, but split in distal part, extending beyond dactyl, evenly cut on upper-distal part, apex clow-like and hooked, distally provided with 1 spine; palm finely pectinate on proximal 2/3 part, with 6 longer and many small setae, these small setae curled distally. Dactyl meeting distal concavity of propod, hooded, grasping margin smooth.

Pereopod 1: Coxa 3 similar to coxa 2, posteriorly with 3 ventral and 1 median long spines. Basis about 2/3 as long as pereopod 1, anterodistal expanding part with 1 row of 9 setae. Merus gradually expanding forward to twice as wide as proximal part, anterodistal rounded margin with 1 longitudinal row of 9 long setae. Posterior setae on carpus arrayed in transverse rows, distal half part of these setae slenderer than proximal half, bifid apically. Propod as long as carpus, posteriorly with 10 short setae, setae formula on anterodistal end 8-7-5. Dactyl 2/3 as long as propod.

Pereopod 2: Coxa 4 slightly produced postero-ventrally, posteriorly with 4 short and 1 ventral long spines. Pereopod 2 very similar to pereopod 1 except for basis distally with 1 long plumose seta.

Pereopod 3: Basis long oval, 1/3 as long as pereopod 3, setose marginally, else outer side provided with 2 plumose setae on distal 1/3 of length. Merus shorter than basis, anteriorly setose, posteriorly with 10 rows of several long unplumose setae. Carpus semicylindrical, obliquely cut anterodistally, posterodistally provided with 1 transverse row of 10 long setae and apically with about 10 short and long setae. Propod about half as long as basis, on distal half part of anterior length with 5 spines. Dactyl about half as long as propod, foliaceous, apically provided with 1 gland cone.

Pereopod 4: Very similar to pereopod 3 in form, but longer. Coxa 6 2/3 as broad as coxa 5, anteriorly provided with 1 proximal and 1 ventral

spines, half part of posterior margin from distal end crenulate, with 14 setae and spines. Muscular part of basis marginally with many short and long plumose setae. Merus distally provided with several short and long setae.

Pereopod 5: Prolonged, but shorter than body length. Coxa 7 semioval, expanding on posterior half part. Posterior thin plate of basis producing far beyond ischium, rectangular distally, muscular part posterodistally provided with 1 long plumose setae. Merus as long as basis, produced posterodistally, with 8 posterodistal spines. Carpus, propod and dactyl continuously decreasing in thickness, former two equal to merus in length, dactyl longer than them, attenuated off, anteriorly provided with 9 plumose setae.

Pleopods: Posterior margin of peduncle on pleopod 1 with supernumeral plumose setae, but setae on pleopods 2–3 unplumose; proximal segment of outer ramus with 3 bifid and 2 simple setae, these setae plumose; apical swimming setae 1/3 as long as rami.

Uropods: Uropods slender, rami lanceolate. Uropod 1 not reaching apex of uropod 2; proximal 2/3 part of outer ventral length submarginally with 1 longitudinal row of 12 setae; rami slightly turned up apically. Peduncle of uropod 2 shorter than rami, outer lateral side with 3 proximal setae. Peduncle of uropod 3 longer than half as long as rami, a little produced ventrodistally; rami equal-sized.

Telson: Telson short, oval, distinctly emarginate, naked.

Remarks

Present form has the long dactyls of pereopods 1–2. These characteristics in *Synchelidium* has been, hitherto, known only in two species, *S. miraculum* Imbach from South China Sea and *S. londigitatum* Ruffo from Mediterranean Sea [3]. However, the present form has the following characteristics which Imbach pointed out to dis-

tinguish *S. miraculum* from *S. londigitatum*; distinct posterior lobe on basis of pereopod 5, longer and more inflated merus of pereopods 1–4, shorter carpus of pereopod 4 and unarmed telson. Moreover, the present form and *S. miraculum* have all other characteristics in common except for the following differences; in *S. miraculum*, 1) rostrum perpendicularly deflected, 2) palp of mandibles less spinose, 3) posteroventral angle of pleonal epimeron 2 not acute, and 4) telson slightly emarginate. As I think that these differences are not presumably important to distinguish the present form from *S. miraculum* in species level the new subspecies, *Synchelidium miraculum lenorotralum*, is allocated to the present form.

Material examined

Holotype: Female, 4.75 mm. *Type-locality*: Surf zone in Ôtsuchi Bay, Iwate Prefecture. *Date*: April 9th, 1978. *Paratype*: 4 specimens collected with the holotype (Female; 3.00 mm, 3.75 mm, 4.50 mm, 5.00 mm). *Collector*: Akio Tamaki. *Collection No.*: AMBL-Amph. 45.

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